

SEQUENCE LISTING

<110> Pietrokovski, Shmuel
Amitai, Gil

<120> CHIMERIC AUTOPROCESSING POLYPEPTIDES AND USES THEREOF

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 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Asn
 50 55 60

Gln Thr Leu Ile Ser Asn Lys Ile His Pro Phe Tyr Ser Xaa Xaa Xaa
 65 70 75 80

Trp Ile Gln Ala Gly Arg Leu Lys Lys Gly Asp Thr Leu Leu Ser Glu
85 90 95

Ser Gly Ala Lys Gln Thr Val Gln Asn Ile Thr Leu Lys Xaa Xaa Xaa
100 105 110

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Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Asn
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Ser Gly Ala Lys Gln Thr Val Gln Asn Ile Thr Leu Lys Xaa Xaa Xaa
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Ser Gly Ala Lys Gln Thr Val Gln Asn Ile Thr Phe Lys Xaa Xaa Xaa
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 35 40 45

Xaa Xaa Xaa Xaa Xaa Asn Ser Leu Asp Phe Phe Val Thr Ala Asp His
 50 55 60

Pro Phe Leu Thr Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Ala Leu Asn Val Thr Gln Leu Val Ile Gly Asp
 85 90 95

Thr Leu Ile Thr Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
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 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 50 55 60

Xaa Xaa Glu Asp Glu Ser Leu Leu Val Thr Pro Gly His Pro Phe Tyr
 65 70 75 80

Val Xaa Xaa Xaa Xaa Xaa Phe Val Pro Val Ile Asp Leu Lys Pro Gly
 85 90 95

Asp Arg Leu Gln Ser Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
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Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
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Xaa Xaa Ser Ser Glu Thr Leu Glu Val Thr Pro Gly His Pro Phe Tyr
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Val Xaa Xaa Xaa Xaa Xaa Phe Val Pro Leu Ile Glu Leu Gln Pro Gly
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Asp Arg Leu Gln Ser Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
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 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
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Xaa Xaa Glu Gly Glu Thr Leu Leu Val Thr Pro Ser His Pro Phe Tyr
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Val Xaa Xaa Xaa Xaa Xaa Phe Val Pro Ala Ile Asn Leu Lys Pro Gly
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Asp Leu Leu Gln Ser Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
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Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Lys Thr Phe Asn
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 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asp Gly Ser Thr
 50 55 60

Leu Thr Ser Thr Thr His His Pro Tyr Trp Ser Xaa Xaa Xaa Xaa Xaa
 65 70 75 80

Trp Lys Asn Ala Gly Asp Leu Glu Ala Gly Asp Thr Leu Arg Thr Pro
 85 90 95

Gln Asn Thr Ala Val Val Ile Ala Ala Thr His Asp Trp Xaa Xaa Xaa
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35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
50 55 60

His Gly Gly Val Val Val Ala Thr Asp Ala His Pro Phe Trp Val Xaa
65 70 75 80

Xaa Xaa Xaa Xaa Trp Val Ala Ala Ile Asp Leu Glu Pro Gly Thr Trp
85 90 95

Leu Arg Thr Ser Ala Gly Thr Trp Val Gln Val Arg Ala Val Ala Val
100 105 110

Arg Xaa Xaa Xaa Xaa Xaa Arg Val His Asn Leu Thr Val Ala Asp Leu
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Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Asn Ser Gln Thr Leu Ile Ser Asn Arg Ile His Pro Phe Tyr Ser
50 55 60

Xaa Xaa Xaa Trp Ile Lys Ala Glu Asp Leu Lys Ala Gly Ser Arg Leu
65 70 75 80

Leu Ser Glu Ser Gly Lys Thr Gln Thr Val Arg Asn Ile Val Val Lys
85 90 95

Xaa Xaa Xaa Xaa Lys Ala Tyr Asn Leu Thr Val Ala Asp Trp His Thr
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65 70 75 80

Trp Ile Lys Ala Glu Asp Leu Lys Ala Gly Asn Arg Leu Phe Ala Glu
85 90 95

Ser Gly Lys Thr Gln Thr Val Arg Asn Ile Val Val Lys Xaa Xaa Xaa
100 105 110

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35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Ser
50 55 60

Gln Thr Leu Ile Ser Asn Arg Ile His Pro Phe Tyr Ser Xaa Xaa Xaa
65 70 75 80

Trp Ile Lys Ala Glu Asp Leu Lys Ala Gly Ser Arg Leu Leu Ser Glu
85 90 95

Ser Gly Lys Thr Gln Thr Val Arg Asn Ile Val Val Lys Xaa Xaa Xaa
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 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Ser
 50 55 60

Gln Thr Leu Ile Ser Asn Arg Ile His Pro Phe Tyr Ser Xaa Xaa Xaa
 65 70 75 80

Trp Ile Lys Ala Glu Asp Leu Lys Ala Gly Ser Arg Leu Phe Ala Glu
 85 90 95

Ser Gly Lys Thr Gln Thr Val Arg Asn Ile Ile Val Lys Xaa Xaa Xaa
 100 105 110

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20 25 30

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35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Ser
50 55 60

Gln Thr Leu Ile Ser Asn Arg Ile His Pro Phe Tyr Ser Xaa Xaa Xaa
65 70 75 80

Trp Ile Lys Ala Glu Asp Leu Lys Ala Gly Ser Arg Leu Leu Ser Glu
85 90 95

Ser Gly Arg Thr Gln Thr Val Arg Asn Thr Val Val Lys Xaa Xaa Xaa
100 105 110

Xaa Lys Ala Tyr Asn Leu Thr Val Ala Asp Trp His Thr Tyr Phe Val
115 120 125

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 20 25 30

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 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Ser
 50 55 60

Gln Thr Leu Ile Ser Asn Arg Ile His Pro Phe Tyr Ser Xaa Xaa Xaa
 65 70 75 80

Trp Ile Gln Ala Gly Arg Leu Lys Lys Gly Asp Thr Leu Leu Ser Glu
 85 90 95

Ser Gly Ala Lys Gln Thr Val Gln Asn Ile Thr Leu Lys Xaa Xaa Xaa
 100 105 110

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20 25 30

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35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Ser
50 55 60

Gln Thr Leu Ile Ser Asn Arg Ile His Pro Phe Tyr Ser Xaa Xaa Xaa
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Trp Ile Gln Ala Gly Arg Leu Lys Lys Gly Asp Thr Leu Leu Ser Glu
85 90 95

Ser Gly Ala Lys Gln Thr Val Gln Asn Ile Thr Phe Lys Xaa Xaa Xaa
100 105 110

Xaa Lys Ala Tyr Asn Leu Thr Val Ala Asp Trp His Thr Tyr Phe Val
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<400> 25

Ser Phe His Gly Ser Thr Leu Val Lys Thr Ala Asp Gly Tyr Lys Ala
1 5 10 15

Ile Ala His Ile Arg Val Gly Glu Ser Val Leu Ser Lys Asp Glu Ala
20 25 30

Ser Gly Lys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Ser
50 55 60

Gln Thr Leu Val Ser Asn Lys Ile His Pro Phe Tyr Ser Xaa Xaa Xaa
65 70 75 80

Trp Ile Lys Ala Glu Asp Leu Lys Ala Gly Ser Arg Leu Leu Ser Glu
85 90 95

Ser Gly Lys Thr Gln Thr Val Arg Asn Ile Val Val Lys Xaa Xaa Xaa
100 105 110

Xaa Lys Ala Tyr Asn Leu Thr Val Ala Asp Trp His Thr Tyr Phe Val
115 120 125

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Glu Gly Val Trp Val His Asn Ala
130 135 140

<210> 26

<211> 143

<212> PRT

<213> Neisseria meningitidis (group C)

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<400> 26

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Ser Gly Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Ser
50 55 60

Gln Thr Leu Val Ser Asn Lys Ile His Pro Phe Tyr Ser Xaa Xaa Xaa
65 70 75 80

Trp Ile Gln Ala Gly Arg Leu Lys Lys Gly Asp Thr Leu Leu Ser Glu
85 90 95

Ser Gly Ala Lys Gln Thr Val Gln Asn Ile Thr Leu Lys Xaa Xaa Xaa
100 105 110

Xaa Lys Ala Tyr Asn Leu Thr Val Ala Asp Trp His Thr Tyr Phe Val
115 120 125

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Glu Gly Val Trp Val His Asn Ser
130 135 140

<210> 28
<211> 164
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<213> Mannheimia haemolytica

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<223> Xaa can be any naturally occurring amino acid

<400> 28

Ser Phe His Gly Asp Met Glu Val Lys Thr Asp Lys Gly Tyr Arg Gln
1 5 10 15

Ile Ser Ser Ile Lys Val Gly Asp Lys Val Leu Ala Lys Asn Glu Arg
20 25 30

Thr Gly Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Lys Tyr
50 55 60

His Thr Ile Val Ser Asn Lys Ile His Pro Phe Phe Thr Xaa Xaa Xaa
65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 85 90 95

Xaa Xaa Xaa Xaa Xaa Trp Val Asp Ala Gln His Leu Gln Lys Gly Tyr
 100 105 110

Arg Leu Leu Ala Glu Ser Gly Glu Trp Gln Thr Val Thr Lys Val Lys
 115 120 125

Ile Lys Xaa Xaa Xaa Xaa Lys Ala Tyr Asn Met Thr Val Glu Lys Asp
 130 135 140

His Thr Tyr Phe Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Glu Gly Val Trp
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Val His Asn Asp

<210> 29
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<400> 29

Cys Phe Val Ala Gly Thr Leu Ile Leu Thr Val Ala Gly Leu Val Ala
 1 5 10 15

Ile Glu Asn Ile Lys Ala Gly Asp Lys Val Ile Ala Thr Asn Leu Glu
 20 25 30

Thr Phe Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Gly Glu Val Ile Lys Thr
 50 55 60

Thr Phe Glu His Pro Phe Tyr Val Xaa Xaa Xaa Xaa Phe Val Glu Ala
 65 70 75 80

Lys Glu Leu Gln Val Gly Asp Lys Leu Leu Asp Ser Lys Gly Asn Val
85 90 95

Leu Val Val Glu Glu Lys Lys Leu Glu Xaa Xaa Xaa Xaa Xaa Xaa Lys
100 105 110

Val Tyr Asn Phe His Val Asp Asp Phe Tyr Thr Tyr His Val Xaa Xaa
115 120 125

Asn Gly Ile Leu Val His Asn Ala
130 135

<210> 30
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<400> 30

Cys Phe Val Ala Gly Thr Met Val Leu Thr Ala Ala Gly Leu Val Ala
1 5 10 15

Ile Glu Asn Ile Lys Val Gly Asp Lys Val Ile Ala Ala Asn Pro Glu
20 25 30

Thr Phe Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Gly Glu Val Ile Lys Thr
50 55 60

Thr Val Asp His Pro Phe Tyr Val Xaa Xaa Xaa Xaa Phe Val Glu Ala
65 70 75 80

Val Asn Leu Gln Val Gly Asp Lys Leu Val Asp Ser Lys Gly Asn Val
85 90 95

Leu Val Val Glu Glu Lys Lys Leu Lys Xaa Xaa Xaa Xaa Xaa Xaa Lys
100 105 110

Val Tyr Asn Phe Lys Val Asp Asp Phe His Thr Tyr His Val Xaa Xaa
 115 120 125

Lys Gly Ile Leu Val His Asn Ala
 130 135

<210> 31
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<400> 31

Cys Phe Val Ala Gly Thr Met Ile Leu Thr Ala Thr Gly Leu Val Ala
 1 5 10 15

Ile Glu Asn Ile Lys Ala Gly Asp Lys Val Ile Ala Thr Asn Pro Glu
 20 25 30

Thr Phe Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Gly Glu Val Ile Lys Thr
 50 55 60

Thr Phe Asp His Pro Phe Tyr Val Xaa Xaa Xaa Xaa Phe Val Glu Ala
 65 70 75 80

Gly Lys Leu Gln Val Gly Asp Lys Leu Leu Asp Ser Arg Gly Asn Val
 85 90 95

Leu Val Val Glu Glu Lys Lys Leu Glu Xaa Xaa Xaa Xaa Xaa Xaa Lys
 100 105 110

Val Tyr Asn Phe Lys Val Asp Asp Phe His Thr Tyr His Val Xaa Xaa
 115 120 125

Asn Glu Val Leu Val His Asn Ala
 130 135

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<400> 32

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Ile Glu Asn Ile Lys Ala Gly Asp Lys Val Ile Ala Thr Asn Pro Glu
 20 25 30

Thr Phe Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Gly Glu Val Ile Lys Thr
 50 55 60

Thr Phe Asp His Pro Phe Tyr Val Xaa Xaa Xaa Xaa Phe Val Glu Ala
 65 70 75 80

Lys Gln Leu His Val Gly Asp Lys Leu Leu Asp Ser Lys Gly Asn Val
 85 90 95

Leu Val Val Glu Asp Lys Lys Ile Lys Xaa Xaa Xaa Xaa Xaa Xaa Lys
 100 105 110

Val Tyr Asn Phe Gln Val Ala Asp Phe His Thr Tyr His Val Xaa Xaa
 115 120 125

Asn Gly Val Leu Val His Asn Val
 130 135

<210> 33
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<400> 33

Cys Phe Val Ala Gly Thr Met Ile Leu Thr Val Ala Gly Leu Val Ala
 1 5 10 15

Ile Glu Asn Ile Lys Ala Gly Asp Lys Val Ile Ala Thr Asn Pro Glu
 20 25 30

Thr Phe Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Gly Asp Val Ile Lys Thr
 50 55 60

Thr Phe Glu His Leu Phe Tyr Ala Xaa Xaa Xaa Xaa Phe Val Glu Ala
 65 70 75 80

Lys Glu Leu Gln Val Gly Asp Lys Leu Leu Asp Ser Lys Gly Asn Val
 85 90 95

Leu Val Val Glu Asp Lys Lys Ile Lys Xaa Xaa Xaa Xaa Xaa Xaa Lys
 100 105 110

Val Tyr Asn Phe Gln Val Asp Asp Phe His Thr Tyr His Val Xaa Xaa
 115 120 125

Asn Gly Val Leu Val His Asn Val
 130 135

<210> 34
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<400> 34

Cys	Phe	Val	Ala	Gly	Thr	Met	Ile	Leu	Thr	Ala	Thr	Gly	Leu	Val	Ala
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Ile	Glu	Asn	Ile	Lys	Ala	Gly	Asp	Lys	Val	Ile	Ala	Thr	Asn	Pro	Glu
		20						25					30		

Thr	Phe	Glu	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
		35					40						45		

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Gly	Xaa	Glu	Ile	Ile	Lys	Thr
	50					55						60				

Thr	Leu	Gly	His	Leu	Phe	Tyr	Val	Xaa	Xaa	Xaa	Xaa	Phe	Val	Glu	Ala
65					70					75					80

Val	Lys	Leu	Gln	Pro	Thr	Asp	Lys	Leu	Val	Asp	Ser	Gly	Gly	Asn	Val
				85					90					95	

Leu	Val	Val	Glu	Xaa	Lys	Lys	Phe	Glu	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Lys
			100					105						110	

Val	Tyr	Asn	Phe	Lys	Val	Asn	Asp	Phe	Tyr	Thr	Tyr	His	Val	Xaa	Xaa
		115					120					125			

Asn	Gly	Ile	Leu	Val	His	Asn	Val
	130					135	

<210> 35

<211> 136

<212> PRT

<213> Clostridium thermocellum

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<400> 35

Cys Phe Val Ala Gly Thr Met Ile Leu Thr Ala Thr Gly Leu Val Ala
 1 5 10 15

Ile Glu Asn Ile Lys Ala Gly Asp Lys Val Ile Ala Thr Asn Pro Glu
 20 25 30

Thr Phe Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Xaa Glu Ile Ile Lys Thr
 50 55 60

Thr Leu Gly His Leu Phe Tyr Val Xaa Xaa Xaa Xaa Phe Val Glu Ala
 65 70 75 80

Val Lys Leu Gln Pro Thr Asp Lys Leu Val Asp Ser Gly Gly Asn Val
 85 90 95

Leu Val Val Glu Xaa Lys Lys Phe Glu Xaa Xaa Xaa Xaa Xaa Xaa Lys
 100 105 110

Val Tyr Asn Phe Lys Val Asn Asp Phe Tyr Thr Tyr His Val Xaa Xaa
 115 120 125

Asn Gly Ile Leu Val His Asn Val
 130 135

<210> 36
 <211> 214
 <212> PRT
 <213> Leptospira interrogans

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<400> 36

Cys Phe Thr Ala Gly Ser Lys Val Thr Lys Leu Lys Asn Phe Ala Asn
 1 5 10 15

Ile Glu Glu Ile Lys Ile Gly Asp Ile Val Arg Ser Trp Asn Glu Asn
 20 25 30

Thr Asn Thr Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Glu Glu Glu Ile His
 50 55 60

Thr Thr Trp Asn His Pro Phe Arg Arg Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 85 90 95

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 100 105 110

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 115 120 125

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 130 135 140

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Trp Val Lys Val Glu Asp Leu Arg Leu
 145 150 155 160

Lys Asp Gln Val Leu Arg Ser Asp Gly Ser Trp Gly Thr Val Thr Gly
 165 170 175

Ile Tyr Tyr Tyr Xaa Xaa Xaa Xaa Xaa Lys Val Tyr Asn Leu Glu Val
 180 185 190

Glu Asp Asn His Thr Tyr Val Val Xaa Xaa Xaa Xaa Xaa Xaa Ile Gly
 195 200 205

Tyr Val Val His Asn Tyr
 210

<210> 37
 <211> 239
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 <213> Leptospira interrogans

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<400> 37

Cys Phe Val Ala Gly Ser Lys Val Thr Lys Leu Lys Asn Xaa Xaa Xaa
 1 5 10 15

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Phe Ala Asn Ile Glu Glu
 35 40 45

Ile Arg Ile Gly Asp Val Val Arg Ser Trp Asn Glu Asn Thr Asn Thr
 50 55 60

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Glu Glu Glu Ile His Thr Thr Trp
 85 90 95

Asn His Pro Phe Arg Arg Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 100 105 110

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 115 120 125

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 130 135 140

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 145 150 155 160

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 165 170 175

Trp Val Lys Val Glu Asp Leu Arg Leu Arg Asp Gln Val Leu Arg Ser
 180 185 190

Asp Gly Ser Trp Gly Thr Val Thr Gly Ile Tyr Tyr Tyr Xaa Xaa Xaa
 195 200 205

Xaa Xaa Lys Val Tyr Asn Leu Glu Val Glu Asp Asn His Thr Tyr Val
 210 215 220

Val Xaa Xaa Xaa Xaa Xaa Xaa Lys Gly Tyr Val Val His Asn Tyr
 225 230 235

<210> 38
 <211> 144
 <212> PRT
 <213> Gemmata obscuriglobus

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 <223> Xaa can be any naturally occurring amino acid

<400> 38

Cys Phe Ala Ala Gly Thr Lys Leu Leu Thr Arg Arg Gly Trp Val Ala
 1 5 10 15

Val Glu Leu Leu Gly Ile Gly Asp Glu Val Ala Ser Arg Thr Glu His
 20 25 30

Asp Leu Thr Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Gly Glu Leu Ile
 50 55 60

Arg Thr Thr Pro Glu His Pro Phe Trp Val Xaa Xaa Xaa Xaa Trp Thr
 65 70 75 80

Ala Ala Gly Ser Leu Ala Ala Gly Asp Arg Ile Ala Thr Xaa Xaa Xaa
 85 90 95

Xaa Leu Ser Gly Glu Trp Val Pro Ile Ala Glu Val Phe Asp Thr Xaa
 100 105 110

Xaa Xaa Xaa Pro Val Tyr Asn Leu Arg Val Ala Asp His His Thr Tyr
 115 120 125

Phe Val Xaa Xaa Xaa Xaa Xaa Xaa Phe Ala Ala Trp Ala His Asn Ala
 130 135 140

<210> 39
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<400> 39

Cys Phe Ala Ser Gly Thr Pro Met Arg Thr Pro Gly Gly Trp Cys Asn
 1 5 10 15

Ile Glu Asn Leu Arg Val Gly Asp Phe Val Leu Ser Arg Asp Glu Phe
 20 25 30

Ser Pro Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 50 55 60

Ser Thr Asp Glu His Pro Phe Phe Val Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 85 90 95

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Thr Val
 100 105 110

Tyr Asn Phe Arg Val Ala Asp His His Thr Tyr Phe Val Xaa Xaa Xaa
 115 120 125

Xaa Xaa Xaa Phe Ser Val Trp Ala His Asn Ile
 130 135

<210> 40
 <211> 132
 <212> PRT
 <213> Pirellula sp.

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<400> 40

Cys Leu Val Ala Gly Thr Leu Val Trp Thr Asp Arg Gly Met Arg Pro
 1 5 10 15

Val Glu Ser Leu Arg Leu Gly Asp Gln Val Leu Ser Cys Asp Val Gln
 20 25 30

Thr Gly Ser Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Ser Asp Glu Ile Val Ala
 50 55 60

Ser Lys Gly His Pro Phe Trp Val Xaa Xaa Xaa Xaa Trp Thr Thr Thr
 65 70 75 80

Glu Gln Leu Val Pro Gly Asp Ala Leu His Gly Xaa Xaa Xaa Xaa Xaa
 85 90 95

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Lys Thr Tyr Asn Leu
 100 105 110

Val Val Glu Gln Thr His Ser Tyr Phe Val Xaa Xaa Ser Arg Ile Leu
 115 120 125

Ser His Asp Ala
 130

<210> 41
 <211> 144
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<400> 41

Ser Phe Lys Pro Thr Thr Arg Val Leu Met Lys Asp Gly Xaa Thr Lys
 1 5 10 15

Pro Leu Gly Lys Ile Lys Pro Gly Asp Leu Val Glu Ala Ala Asp Pro
 20 25 30

Thr Ser Gly His Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 50 55 60

Arg Ile Gln Thr Leu His Thr Thr Ala Arg His Arg Ile Trp Asp Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Trp Glu Gln Ala Gly Arg Leu Ile Thr Gly His Lys
 85 90 95

Val Asn Thr Ser Gly Asn Gln His Ala Thr Ile Thr Ser Val Leu Ala
 100 105 110

Gln Xaa Xaa Xaa Xaa Asp Met Tyr Asp Leu Thr Val Glu Gly Leu His
 115 120 125

Thr Tyr Tyr Val Xaa Xaa Xaa Xaa Thr Pro Val Leu Val His Asn Gly
 130 135 140

<210> 42
 <211> 143
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<400> 42

Cys Phe Leu Ala Gly Thr Asp Ile Leu Met Ala Asp Gly Xaa Thr Lys
 1 5 10 15

Asp Ile Glu Glu Val Glu Leu Gly Asp Lys Val Gln Ala Thr Asp Pro
 20 25 30

Lys Thr Gly Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly
 50 55 60

Ala Glu Glu Leu Thr Ala Thr His Glu His Pro Phe Trp Ser Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Trp Ile Thr Ala Gly Ser Leu Glu Pro Gly Met Thr Leu
 85 90 95

Leu Thr Asp Asp Gly Asp Thr Val Ile Val Thr Gly Asn Arg Ala Phe
 100 105 110

Xaa Xaa Xaa Xaa Thr Thr Tyr Asn Leu Thr Val Asn Asp Leu His Thr
 115 120 125

Tyr Tyr Ala Xaa Xaa Xaa Xaa Thr Pro Val Leu Val His Asn Ser
 130 135 140

<210> 43
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<400> 43

Ser Phe Pro Ala Gly Thr Arg Val Leu Met Gly Asp Gly Xaa Xaa Thr
 1 5 10 15

Leu Pro Ile Glu Gln Ile Thr Val Gly Asp Ser Val Leu Ala Thr Asp
 20 25 30

Pro Glu Ala Gly Thr Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 50 55 60

Xaa Xaa Gly Pro Pro Ala Leu Thr Ala Thr Asp Arg His Pro Phe Trp
 65 70 75 80

Val Xaa Xaa Xaa Xaa Xaa Trp Ala Asp Ala Arg Asp Leu Asn Ser Gly
 85 90 95

Asp Thr Leu Arg Thr Pro Asp Gly Thr Gly Val Arg Ile Asp Lys Val
 100 105 110

Thr His Trp Xaa Xaa Xaa Xaa Gly Ala Tyr Asn Leu Thr Val Asn Asp
 115 120 125

Leu His Thr Tyr Tyr Val Xaa Xaa Xaa Xaa Val Pro Val Leu Val His
 130 135 140

Asn Ala
 145

<210> 44
 <211> 129
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 <213> Myxococcus xanthus

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<400> 44

Cys Val Ala Pro Trp Glu Leu Val Leu Leu Gly Asp Gly Xaa Glu Val
1 5 10 15

Pro Ala Glu Met Leu Arg Pro Gly Met Arg Val Leu Thr Met His Glu
20 25 30

His Glu Arg Asp Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asp Gly Arg Val Leu Val
50 55 60

Val Thr Pro Asp His Arg Trp Arg Thr Xaa Xaa Xaa Xaa Xaa Xaa Xaa
65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
85 90 95

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asp Val Met Arg Ile Thr
100 105 110

Val Arg Phe Ala Met Thr Tyr Ile Val Gln Gly Leu Leu Ala His Asn
115 120 125

Leu

<210> 45

<211> 131

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<223> Xaa can be any naturally occurring amino acid

<400> 45

Cys Val Ala Pro Trp Glu Pro Val Leu Leu Ser Asp Gly Xaa Glu Val
1 5 10 15

Pro Ala Glu Met Leu Arg Pro Gly Met Lys Val Leu Thr Met His Glu
20 25 30

His Glu Arg Asp Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asp Gly Arg Ala Val Val
50 55 60

Val Thr Pro Asp His Arg Trp Arg Thr Xaa Xaa Xaa Xaa Xaa Xaa Xaa
65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
85 90 95

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asp Val Met Lys
100 105 110

Ile Ser Val Arg Phe Ala Lys Thr Tyr Val Val Gln Gly Leu Leu Ala
115 120 125

His Asn Leu
130

<210> 46
<211> 137
<212> PRT
<213> Verrucomicrobium spinosum

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<223> Xaa can be any naturally occurring amino acid

<400> 46

Cys Phe Pro Ser Gly Thr Met Val Gln Thr Ala Arg Gly Lys Val Ala
1 5 10 15

Ile Glu Thr Leu Lys Glu Gly Asp Val Val Leu Ala Tyr Asp Phe Leu
20 25 30

Ser Glu Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Asp Ser Lys Ile Ser Ala
50 55 60

Thr Arg Phe His Leu Phe Trp Val Xaa Xaa Xaa Xaa Xaa Trp Val Pro
65 70 75 80

Ala Val Asp Leu Gln Pro Gly Met Val Leu Arg Leu Glu Ser Gly Ala
85 90 95

Leu Thr Val Val Thr Leu Ala Lys Leu Arg Xaa Xaa Xaa Xaa Xaa Xaa
100 105 110

Ala Thr His Asn Phe Glu Val Ala Asp Leu His Asn Tyr Phe Val Xaa
115 120 125

Xaa Gln Gly Phe Leu Val His Asn Gly
130 135

<210> 47
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<212> PRT
<213> Verrucomicrobium spinosum

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<223> Xaa can be any naturally occurring amino acid

<400> 47

Cys Phe Pro Ala Gly Thr Met Val Leu Met Ala Asp Gly Xaa Ser Val
1 5 10 15

Pro Ile Glu Gln Val Val Glu Gly Asp Ile Val Leu Ala Ala Glu Pro
20 25 30

Glu Thr Glu Ser Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Thr Gly Ser Val
50 55 60

Leu Lys Val Thr Gly Glu His Pro Ile Trp Thr Xaa Xaa Xaa Xaa Trp
65 70 75 80

Gln His Ala Asp Asp Leu Val Glu Gly Asp Leu Leu Leu Lys Xaa Xaa
85 90 95

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 100 105 110

Xaa Asp Thr Phe Asn Leu Cys Val Glu Gly Val His Thr Phe Tyr Val
 115 120 125

Xaa Xaa Xaa Xaa Asp Ala Val Leu Val His Asn Thr
 130 135 140

<210> 48
 <211> 145
 <212> PRT
 <213> Verrucomicrobium spinosum

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 <223> Xaa can be any naturally occurring amino acid

<400> 48

Cys Phe Ala Pro Gly Thr Pro Val Leu Met Gly Asp Gly Xaa Thr Arg
 1 5 10 15

Pro Val Glu Thr Ile Arg Glu Gly Asp Trp Ile Met Ala Asp Asp Pro
 20 25 30

Glu Asp Glu Arg Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 50 55 60

Xaa Xaa Pro Asp Gly Ala Leu Lys Ala Thr Gly Gly His Pro Phe Trp
 65 70 75 80

Thr Xaa Xaa Xaa Xaa Trp Ile Lys Val Cys Asn Leu Gln Pro Asn Asp
 85 90 95

Ile Leu Ala Asp Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 100 105 110

Xaa Xaa Xaa Xaa Xaa Xaa Ala Thr Tyr Asn Leu Ser Val Ala Asn Ile
 115 120 125

His Thr Phe Phe Val Xaa Xaa Xaa Xaa Val Pro Val Leu Val His Asn
 130 135 140

Thr
 145

<210> 49
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 <213> Gloeobacter violaceus

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 <222> (132)..(133)
 <223> Xaa can be any naturally occurring amino acid

<400> 49

Cys Phe Ala Glu Gly Thr Glu Val Gln Thr Glu Thr Gly Thr Lys Ala
 1 5 10 15

Ile Glu Lys Val Glu Pro Gly Glu Lys Val Leu Ala Arg Asn Glu Lys
 20 25 30

Thr Gly Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 50 55 60

Glu Arg Asp Thr Leu Thr Val Thr Gly Glu His Pro Phe Phe Leu Xaa
 65 70 75 80

Xaa Xaa Xaa Trp Thr Ala Ala Glu Arg Leu Arg Ser Gly Glu Arg Val
 85 90 95

Gln Ala Val Asp Gly Lys Trp Leu Arg Val Val Gly Leu Gln Pro Gln
 100 105 110

Xaa Xaa Xaa Xaa Arg Thr Tyr Asn Leu Glu Val Glu Gly Glu His Thr
 115 120 125

Phe Phe Val Xaa Xaa Thr Arg Ala Trp Val His Asn Glu
 130 135 140

<210> 50
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 <223> Xaa can be any naturally occurring amino acid

<400> 50

Cys Phe Ala Glu Gly Thr Glu Val Gln Thr Glu Thr Gly Ala Lys Pro
 1 5 10 15

Ile Glu Leu Val Ala Pro Gly Glu Lys Val Leu Ala Arg Asn Glu Gln
 20 25 30

Thr Gly Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 50 55 60

Asp Arg Asp Val Leu Thr Val Thr Gly Glu His Pro Phe Phe Leu Xaa
 65 70 75 80

Xaa Xaa Xaa Trp Thr Ala Ala Asp Lys Leu Gln Val Gly Glu Arg Val
 85 90 95

Gln Thr Val Asp Gly Gln Trp Leu Arg Val Ala Gly Leu Gln Ala Gln
 100 105 110

Xaa Xaa Xaa Xaa Arg Thr Tyr Asn Leu Glu Val Glu Arg Asp His Thr
 115 120 125

Phe Phe Val Xaa Xaa Ser Lys Ala Trp Val His Asn Glu
 130 135 140

<210> 51
 <211> 141
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 <213> Gloeobacter violaceus

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 <222> (132)..(133)
 <223> Xaa can be any naturally occurring amino acid

<400> 51

Cys Phe Ser Glu Gly Thr Glu Val Gln Thr Glu Ala Gly Ala Lys Pro
 1 5 10 15

Ile Glu Leu Val Glu Pro Gly Glu Lys Val Leu Ala Arg Asn Glu Gln
 20 25 30

Thr Gly Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 50 55 60

Glu Arg Asp Thr Leu Thr Val Thr Gly Glu His Pro Phe Phe Leu Xaa
 65 70 75 80

Xaa Xaa Xaa Trp Thr Ala Ala Glu Arg Leu Lys Ser Gly Glu Arg Val
 85 90 95

Gln Ala Ala Asp Gly Lys Trp Leu Arg Val Ala Gly Leu Glu Ala Gln
 100 105 110

Xaa Xaa Xaa Xaa Arg Thr Tyr Asn Leu Glu Val Glu Gly Asp His Thr
 115 120 125

Phe Phe Val Xaa Xaa Asn Gln Ala Trp Val His Asn Glu
 130 135 140

<210> 52
 <211> 139
 <212> PRT
 <213> Chromobacterium violaceum

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<222> (130)..(131)

<223> Xaa can be any naturally occurring amino acid

<400> 52

Cys	Phe	Val	Ala	Gly	Thr	Gln	Val	Leu	Thr	Asp	Lys	Gly	Leu	Lys	Ala
1				5					10					15	

Ile	Glu	Thr	Phe	Val	Gly	Gly	Glu	Trp	Val	Trp	Ser	Arg	Ser	Asp	Gln
			20					25					30		

Thr	Gly	Glu	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
		35					40					45			

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Arg	Gln
		50					55					60				

Glu	Thr	Phe	Arg	Thr	Thr	Ala	Glu	His	Pro	Phe	Trp	Val	Xaa	Xaa	Xaa	
65					70					75				80		

Xaa	Trp	Leu	Lys	Ala	Ser	Leu	Leu	Gln	Ala	Gly	Val	Ile	Leu	Val	Asp
				85					90					95	

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa
			100					105						110		

Xaa	Xaa	Thr	Val	Phe	Asn	Ile	Gln	Val	Ala	Glu	Phe	Gln	Thr	Tyr	His
		115					120					125			

Val	Xaa	Xaa	Leu	Gly	Val	Trp	Val	His	Asn	Ala
		130				135				

<210> 53

<211> 141

<212> PRT

<213> Gloeobacter violaceus

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<400> 55

Phe Val Xaa Xaa Xaa Xaa Xaa Xaa Xaa Glu Gly Val Trp Val His Asn
65 70 75 80

<400> 56

Cys Phe Val Ala Gly Thr Met Ile Leu Thr Ala Thr Gly Leu Val Ala
1 5 10 15

Ile Glu Asn Ile Lys Ala Gly Asp Lys Val Ile Ala Thr Asn Pro Glu
 20 25 30

Thr Phe Glu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Asn Gly Glu Val Ile Lys Thr
 50 55 60

Thr Phe Glu His Pro Phe Tyr Val Xaa Xaa Xaa Xaa Phe Val Glu Ala
 65 70 75 80

Gly Lys Leu Gln Ile Gly Asp Arg Leu Val Asp
 85 90

<210> 57
 <211> 45
 <212> PRT
 <213> Clostridium thermocellum

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 <223> Xaa can be any naturally occurring amino acid

<400> 57

Ser Lys Gly Asn Val Leu Val Val Glu Glu Lys Lys Leu Glu Xaa Xaa
 1 5 10 15

Xaa Xaa Xaa Xaa Lys Val Tyr Asn Phe Lys Val Asn Asp Phe His Thr
 20 25 30

Tyr His Val Xaa Xaa Asp Gly Ile Leu Val His Asn Ala
 35 40 45

<210> 58
 <211> 24
 <212> PRT
 <213> Clostridium thermocellum

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<400> 58

Val Tyr Asn Phe Lys Val Asp Asn Phe His Thr Tyr His Val Xaa Xaa
 1 5 10 15

Asn Arg Val Leu Val His Asn Ala
 20

<210> 59

<211> 39
 <212> PRT
 <213> Clostridium thermocellum

<220>
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 <223> Xaa can be any naturally occurring amino acid

<400> 59

Phe Val Lys Glu Met Lys Leu Gln Pro Gly Asn Arg Leu Val Asp Xaa
 1 5 10 15

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 20 25 30

Xaa Xaa Lys Val Tyr Asn Phe
 35

<210> 60
 <211> 63
 <212> PRT
 <213> Leptospira interrogans

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 <222> (50)..(55)
 <223> Xaa can be any naturally occurring amino acid

<400> 60

Trp Val Lys Val Glu Asp Leu Arg Leu Arg Asp Gln Val Leu Arg Ser
 1 5 10 15

Asp Gly Ser Trp Gly Thr Val Thr Gly Ile Tyr Tyr Tyr Xaa Xaa Xaa
 20 25 30

Xaa Xaa Lys Val Tyr Asn Leu Glu Val Glu Asp Asn His Thr Tyr Ile
 35 40 45

Val Xaa Xaa Xaa Xaa Xaa Xaa Ile Gly Tyr Val Val His Asn Tyr
 50 55 60

<210> 61
 <211> 10
 <212> PRT
 <213> Gloeobacter violaceus

<400> 61

Cys Phe Ala Glu Gly Thr Glu Val Gln Thr
 1 5 10

<210> 62
 <211> 15
 <212> PRT
 <213> Gloeobacter violaceus

<400> 62

Trp Thr Ala Ala Glu Arg Leu Glu Pro Gly Asp Arg Val Gln Ala
 1 5 10 15

<210> 63

<211> 153

<212> PRT

<213> Rhodobacter capsulatus

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<221> misc_feature

<222> (45)..(56)

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<222> (67)..(80)

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<223> Xaa can be any naturally occurring amino acid

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<221> misc_feature

<222> (122)..(129)

<223> Xaa can be any naturally occurring amino acid

<400> 63

Cys Phe Thr Pro Gly Thr Leu Ile Asp Thr Pro Ala Gly Pro Arg Pro
 1 5 10 15

Val Glu Ala Leu Arg Pro Gly Asp Arg Val Ser Thr Arg Asp Xaa Xaa
 20 25 30

Xaa Gln Glu Ile Leu Trp Ile Gly Ser Arg Arg Met Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Val Arg Leu Gly Ala Val Arg
 50 55 60

Leu Gly Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 65 70 75 80

Ala Ala Asp Leu Leu Val Ser Pro Gln His Arg Val Leu Val Xaa Xaa
 85 90 95

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Glu Val Leu Val Gln Ala
 100 105 110

Cys Asp Leu Val Asp Asp Ala Ala Val Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 115 120 125

Xaa Val Thr Tyr Leu His Leu Leu Phe Ala Arg His Gln Val Ile Arg
 130 135 140

Ala Asn Gly Val Glu Thr Glu Ser Phe
 145 150

<210> 64
 <211> 141
 <212> PRT
 <213> Rhodobacter capsulatus

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<400> 64

Gly Phe Tyr Gly Glu Thr Val Leu Gln Thr Ala Arg Gly Leu Arg Arg
 1 5 10 15

Val Ser Ser Ile Leu Glu Gly Glu Lys Met Arg Thr Phe Thr Xaa Xaa
 20 25 30

Xaa Ala Pro Val Leu Ser Ile Glu Arg Phe Ala Leu Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Leu Ser Leu Pro Ala Gly Leu
 50 55 60

Phe Gly Xaa Thr Arg Asn Arg Phe Val Ala Pro Glu Gln Cys Leu Leu
 65 70 75 80

Leu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu Leu Leu
 85 90 95

Val Pro Ala Lys Val Leu Gly Leu Leu Pro Gln Val Xaa Xaa Xaa Xaa
 100 105 110

Xaa Xaa Xaa Xaa Ala Val Leu Tyr Arg Leu Leu Phe Glu Arg Pro Glu
 115 120 125

Leu Val Val Thr Asp Xaa Gly Ala Val Met Leu Cys Asp
 130 135 140

<210> 65
 <211> 134
 <212> PRT
 <213> Rhodobacter capsulatus

<220>
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<400> 65

Gly Phe Ala Ala Gly Thr Arg Val Arg Thr Pro Ala Gly Leu Arg Arg
 1 5 10 15

Ile Glu Thr Leu Lys Pro Gly Asp Leu Val Glu Thr Gln Glu Xaa Xaa
 20 25 30

Xaa Gln Pro Val Val Ala Val Glu Arg Thr Arg Leu Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Pro Ile Arg Phe Ala Ala Gly Ala His Gly Xaa Glu Arg
 50 55 60

Pro Val Leu Val Ala Pro Gln Gln Arg Val Leu Val Xaa Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Glu Val Leu Val Ala Ala Arg Thr
 85 90 95

Leu Val Asp Gly Glu Met Val Xaa Xaa Xaa Xaa Xaa Xaa Val Asp
 100 105 110

Tyr Val Arg Leu Val Phe Asp Cys Ala His Met Val Phe Ala Glu Gly
 115 120 125

Leu Ala Val Glu Cys Phe
130

<210> 66
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<400> 66

Cys Phe Ala Pro Ser Thr Pro Ile Ala Thr Pro Gly Gly Asp Cys Pro
1 5 10 15

Ala Ala Ser Leu Lys Ala Gly Asp Leu Val Leu Thr Ala Asp Xaa Xaa
20 25 30

Xaa Gln Pro Ile Leu Trp Ser Gly Arg Ile Ala Leu Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Pro Val Arg Leu Cys Ala Pro Ala Phe Gly Xaa Thr Arg
50 55 60

Asp Leu Trp Val Leu Pro Gln His Arg Val Ala Leu Xaa Xaa Xaa Xaa
65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Glu Val Leu Val Pro Ala His His
85 90 95

Leu Val Asp Gly Ile Ser Ala Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu
100 105 110

Ser Trp His Gly Leu Leu Leu Gln Gly His His Leu Leu Ile Ala Asp
115 120 125

Gly Cys Arg Val Glu Ser Leu
130 135

<210> 67
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 <223> Xaa can be any naturally occurring amino acid

<400> 67

Cys Phe Thr Ala Gly Thr Leu Ile Glu Thr Pro Arg Gly Pro Val Pro
 1 5 10 15

Val Glu Ser Leu Arg Ala Gly Asp Leu Val Val Thr Arg Asp Xaa Xaa
 20 25 30

Xaa Val Pro Val Leu Trp Ser Gly Gly Arg Ser Leu Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Val Ala Ile Arg Glu Asn Ala
 50 55 60

Leu Gly Xaa His Gly Ala Leu Leu Leu Ser Pro Gln His Ala Val Leu
 65 70 75 80

Ala Xaa Xaa Xaa Xaa Xaa Glu Arg Leu Val Arg Ala Arg His Leu Ala
 85 90 95

Gly Leu Asn Asp Pro Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Val
 100 105 110

Ser Tyr His His Ile Leu Leu Glu Arg His Gly Ile Val Thr Ala Asn
 115 120 125

Gly Leu Ala Cys Glu Ser Leu
 130 135

<210> 68
 <211> 146
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<222> (115)..(122)

<223> Xaa can be any naturally occurring amino acid

<400> 68

Ala Leu Ala Arg Gly Ser Val Leu Met Thr Glu Asp Gly Pro Val Ala
1 5 10 15

Ile Glu Asp Leu Gln Pro Gly Gln Gly Val Leu Thr Ala Glu Xaa Xaa
20 25 30

Xaa Glu Arg Val Cys Trp Ile Gly Ser Met Val Ile Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu Thr Arg Ile Thr
50 55 60

Ala Glu Ala Phe Gly Xaa Xaa Xaa Xaa Ala Leu Asp Leu Val Leu Gly
65 70 75 80

Pro Arg Ala Arg Leu Cys Leu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
85 90 95

Xaa Xaa Xaa Ala Ala Asp Val Pro Ala Arg Ala Phe Leu Asp Gly Ile
100 105 110

Ser Val Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Val Thr Val Tyr His Val
115 120 125

Val Leu Glu Gln His Gly Ser Leu Arg Val Ala Gly Leu Glu Val Glu
130 135 140

Ala Phe
145

<210> 69

<211> 136

<212> PRT

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 <223> Xaa can be any naturally occurring amino acid

<400> 69

Cys Leu Gly Thr Gly Thr Met Ile Ala Thr Ala Glu Gly Pro Ala Pro
 1 5 10 15

Ile Asp Trp Leu Arg Pro Gly Asp Arg Val Leu Thr Arg Asp Xaa Xaa
 20 25 30

Xaa Gln Pro Leu Leu Trp Val Gly Gln His Thr Met Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Pro Leu Leu Leu Ser Ala Ala Cys Phe Gly Xaa
 50 55 60

Xaa Xaa Xaa Glu Arg Asp Val Leu Leu Ser Pro Gly Thr Gly Val Leu
 65 70 75 80

Leu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Glu Met Phe
 85 90 95

Ala Lys Ala Arg His Ala Leu Pro Lys Ala Glu Ala Xaa Xaa Xaa Xaa
 100 105 110

Gln Lys Leu Tyr Ser Met Leu Leu Ala Thr Pro Glu Val Val Leu Ala
 115 120 125

Glu Gly Met Trp Val Gly Ser Val
 130 135

<210> 70
 <211> 132
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 <213> Rhodobacter capsulatus

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 <223> Xaa can be any naturally occurring amino acid

<400> 70

Cys Phe Ala Ala Gly Thr Leu Ile Ala Thr Arg Arg Gly Pro Lys Pro
 1 5 10 15

Val Glu Asp Leu Gly Pro Glu Asp Arg Leu Gln Thr Ser Asp Xaa Xaa
 20 25 30

Xaa Arg Pro Val Gln Trp Val Gly Arg Trp Arg Val Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Pro Val Arg Phe Ala Pro Gly Val Leu Gly Xaa Asp Arg
 50 55 60

Ala Leu Phe Leu Ser Gly Gln His Arg Val Leu Ile Xaa Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Glu Val Leu Val Ala Ala Lys Ala Leu Val
 85 90 95

Gly Leu Pro Gly Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Val Asp Trp Val
 100 105 110

His Val Met Met Pro Thr His Glu Val Ile Phe Ala Glu Asn Ala Arg
 115 120 125

Ala Glu Thr Met
 130

<210> 71
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 <223> Xaa can be any naturally occurring amino acid

<400> 71

Ala Phe Thr Thr Gly Thr Leu Ile Thr Met Ala Gly Gly Xaa Gln Arg
 1 5 10 15

Pro Ile Glu Thr Leu Ala Pro Gly Asp Arg Val Leu Thr Arg Asp Xaa
 20 25 30

Xaa Xaa Gln Pro Val Arg Leu Val Ala Arg Ala Thr Leu Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Pro Val Val Ile Ser Ala Gly Thr Leu Gly Xaa Glu
 50 55 60

Ser Asp Leu Val Val Ala Pro His His Arg Val Phe Leu Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Glu Ile Leu Val Gln Ala Lys
 85 90 95

His Leu Val Asp Gly Glu His Val Xaa Xaa Xaa Xaa Xaa Xaa Xaa Val
 100 105 110

Asp Tyr Phe Ala Leu Val Phe Asp Arg His Glu Ile Val Tyr Ala Glu
 115 120 125

Gly Val Pro Val Glu Ser Leu
 130 135

<210> 72
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 <223> Xaa can be any naturally occurring amino acid

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 <223> Xaa can be any naturally occurring amino acid

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 <223> Xaa can be any naturally occurring amino acid

<400> 72

Cys Phe Thr Ala Thr Ser Leu Ile Ala Thr Gly Gln Gly Gly Val Pro
 1 5 10 15

Val Ser Glu Leu Val Pro Gly Ala Arg Val Ile Thr Arg Asp Xaa Xaa
 20 25 30

Xaa Gln Glu Leu Leu Trp Val Gly Arg Arg Arg Phe Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Val Arg Ile Ala Ala Gly Ala
 50 55 60

Leu Gly Xaa Xaa Xaa Xaa Glu Arg Asp Met Leu Val Ser Pro Asn His
 65 70 75 80

Arg Phe Leu Thr Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Glu Arg Leu
 85 90 95

Thr Met Ala Arg Asp Leu Val Gly Leu Asp Gly Ile Xaa Xaa Xaa Xaa
 100 105 110

Xaa Xaa Xaa Val Asp Tyr Trp Gln Leu Leu Phe Ala His His Glu Leu
 115 120 125

Val Leu Ala Asp Gly Ala Trp Ser Glu Ser Phe
 130 135

<210> 73
 <211> 142
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<222> (67)..(70)

<223> Xaa can be any naturally occurring amino acid

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<222> (85)..(96)

<223> Xaa can be any naturally occurring amino acid

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<222> (112)..(118)

<223> Xaa can be any naturally occurring amino acid

<400> 73

Cys Leu Thr Pro Gly Thr Leu Ile Glu Thr Lys Arg Gly Gln Val Pro
1 5 10 15

Val Glu Lys Leu Arg Pro Gly Asp Arg Val Leu Thr Arg Asp Xaa Xaa
20 25 30

Xaa Gln Pro Ile Arg Trp Ile Gly Arg Arg Arg Leu Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Val Arg Ile Ala Ala Gly Ala
50 55 60

Leu Gly Xaa Xaa Xaa Xaa Glu Thr Asp Met Leu Val Ser Pro Gln His
65 70 75 80

Arg Met Leu Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
85 90 95

Glu Val Leu Ala Ala Ala Leu His Met Leu Gly Gln Pro Gly Ile Xaa
100 105 110

Xaa Xaa Xaa Xaa Xaa Xaa Val Thr Tyr Leu His Leu Met Leu Asp Ala
115 120 125

His Glu Ile Ile Arg Ala Asn Gly Ala Trp Thr Glu Ser Phe
130 135 140

<210> 74

<211> 136

<212> PRT

<213> Rhodobacter capsulatus

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<222> (45)..(56)

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<222> (67)..(67)
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 <222> (99)..(112)
 <223> Xaa can be any naturally occurring amino acid

<400> 74

Cys Leu Val Ala Gly Ser Arg Val Ser Thr Pro Arg Gly Pro Val Pro
 1 5 10 15

Val Glu Asp Leu Arg Pro Glu Asp Leu Val Thr Val Arg Asp Xaa Xaa
 20 25 30

Xaa Leu Pro Val Leu Trp Ile Gly Arg Arg Arg Val Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Val Glu Ile Gly Ala Gly Arg
 50 55 60

Leu Gly Xaa Ala Ala Pro Val Arg Leu Ser Ala Leu His Gly Ile Ala
 65 70 75 80

Val Xaa Xaa Gly Phe Leu Ala Arg Ala Gly His Leu Ala Ala Thr Gly
 85 90 95

Trp Gly Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 100 105 110

Val Leu Tyr Leu His Leu Leu Leu Pro Arg His Ala Leu Leu Ser Val
 115 120 125

Glu Gly Leu Trp Val Glu Ser Phe
 130 135

<210> 75
 <211> 132
 <212> PRT
 <213> Rhodobacter capsulatus

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 <223> Xaa can be any naturally occurring amino acid

<400> 75

Gly Phe Ala Met Gly Ser Arg Val Ala Thr Met Asp Gly Leu Leu Pro
 1 5 10 15

Val Glu Phe Leu Asn Leu Gly Asp Arg Ile Val Thr Arg Ser Xaa Xaa
 20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu Val
 35 40 45

Gly Ile Ala Pro Gly Ala Leu Gly Xaa Xaa Xaa Xaa Gly Gln Ala Met
 50 55 60

Val Leu Gly Ser Gly Thr Gln Val Leu Leu Xaa Xaa Xaa Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Gln Ala Leu Val Ala Val Glu Arg Leu Ile
 85 90 95

Asp Gly Gln Phe Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Ile Arg Ile Phe
 100 105 110

Ala Leu His Phe Glu Ala Pro Glu Val Ile Tyr Ala Asp Gly Val Glu
 115 120 125

Ile Gly Cys Lys
 130

<210> 76
 <211> 142
 <212> PRT
 <213> Rhodobacter sphaeroides

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 <223> Xaa can be any naturally occurring amino acid

<400> 76

Cys Phe Thr Pro Gly Thr Leu Ile Ala Thr Val Arg Gly Glu Val Ala
 1 5 10 15

Val Glu Ala Leu Ala Ala Gly Asp Arg Ile Val Thr Arg Asp Xaa Xaa
 20 25 30

Xaa Gln Pro Leu Arg Trp Ile Ser Arg Arg Arg Leu Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Val Leu Ile Glu Lys Gly Ser
 50 55 60

Leu Gly Xaa Xaa Xaa Xaa Asp Arg Asp Met Met Val Ser Pro Asn His
 65 70 75 80

Arg Ile Leu Val Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 85 90 95

Glu Val Leu Val Ala Ala Lys His Leu Val Gly Pro Arg Gly Ile Xaa
 100 105 110

Xaa Xaa Xaa Xaa Xaa Xaa Thr Thr Tyr Leu His Leu Met Phe Asp Arg
 115 120 125

His Glu Val Val Leu Ala Asn Gly Ala Trp Thr Glu Ser Phe
 130 135 140

<210> 77

<211> 133

<212> PRT

<213> Rhodobacter sphaeroides

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<223> Xaa can be any naturally occurring amino acid

<400> 77

Ser Leu Thr Ala Gly Thr Pro Val Leu Thr Leu Ala Gly Ile Arg Pro
 1 5 10 15

Ala Glu Gly Ile Arg Pro Gly Asp Arg Leu Val Ala Arg Ser Xaa Xaa
 20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Met
 35 40 45

Val Ala Ile Gly Ala Ser Thr Leu Ala Xaa Xaa Xaa Xaa Asp Glu Thr
 50 55 60

Leu Leu Val Pro Ala Asp Gln Pro Leu Leu Leu Xaa Xaa Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Val Val Leu Pro Ala Arg Arg Leu
 85 90 95

Val Asp Gly Gln Leu Thr Xaa Xaa Xaa Xaa Xaa Xaa Xaa Val Asp Leu
 100 105 110

Val Thr Leu Thr Phe Ala Ala Pro Ala Ala Ile Tyr Ala Ser Glu Leu
 115 120 125

His Pro Val Thr Arg
 130

<210> 78
 <211> 132
 <212> PRT
 <213> Brucella suis

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 <223> Xaa can be any naturally occurring amino acid

<400> 78

Cys Leu Leu Lys Gly Thr Leu Val Thr Thr Pro Asn Gly Pro Val Ala
 1 5 10 15

Val Glu Lys Leu Cys Val Gly Asp Leu Val Thr Thr Val Ser Xaa Xaa
 20 25 30

Xaa Leu Pro Ile Lys Trp Ile Gly Trp Gln Asn Tyr Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Ile Arg Val Arg Arg His Ala
50 55 60

Leu Asp Xaa Xaa Xaa Xaa His Arg Asp Leu Tyr Leu Ser Pro Asn His
65 70 75 80

Ala Leu Phe Ile Xaa Gly Val Leu Ile Arg Val Lys Asp Leu Val Asn
85 90 95

Gly Arg Ser Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu Asp Tyr Tyr
100 105 110

Asn Ile Val Leu Asp Arg His Ala Val Val Leu Ala Glu Gly Ala Ala
115 120 125

Val Glu Thr Phe
130

<210> 79
<211> 132
<212> PRT
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<223> Xaa can be any naturally occurring amino acid

<220>
<221> misc_feature
<222> (101)..(108)
<223> Xaa can be any naturally occurring amino acid

<400> 79

Cys Leu Leu Lys Gly Thr Leu Val Thr Thr Pro Asn Gly Pro Val Ala
1 5 10 15

Val Glu Lys Leu Cys Val Gly Asp Leu Val Thr Thr Val Ser Xaa Xaa
20 25 30

Xaa Leu Pro Ile Lys Trp Ile Gly Trp Gln Asn Tyr Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Ile Arg Val Arg Arg His Ala
50 55 60

Arg Ile Leu Lys Asn Ala Ile Ser Xaa Xaa Xaa Xaa His Lys Asp Leu
65 70 75 80

Leu Val Thr Pro Glu His Cys Leu Phe Phe Xaa Gly Lys Phe Ile Pro
85 90 95

Val Arg Met Leu Val Asn His Gln Thr Ile Xaa Xaa Xaa Xaa Xaa Xaa
100 105 110

Xaa Xaa Tyr Thr Tyr Tyr His Ile Glu Thr Glu Asn His Ser Val Ile
115 120 125

Tyr Ser Asp Gly Met Leu Thr Glu Ser Tyr
130 135

<210> 81
<211> 138
<212> PRT
<213> Unknown

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<223> Xaa can be any naturally occurring amino acid

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<222> (107)..(114)
<223> Xaa can be any naturally occurring amino acid

<400> 81

Cys Phe Leu Ser Gly Thr Gln Ile Lys Thr Lys Leu Gly Val Lys Asn
1 5 10 15

Ile Glu Ala Leu Gln Val Gly Asp Phe Val Thr Thr Tyr Asp Xaa Xaa
20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Arg Glu Val Thr Trp Val Gly Xaa Lys Tyr
35 40 45

Cys Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Val
 50 55 60

Arg Ile Val Lys Asp Ala Ile Ala Xaa Xaa Xaa Xaa Tyr Lys Asp Leu
 65 70 75 80

Leu Val Thr Ala Glu His Cys Leu Phe Phe Xaa Asp Lys Phe Ile Pro
 85 90 95

Ala Arg Met Leu Val Asn Gly Ser Thr Ile Xaa Xaa Xaa Xaa Xaa Xaa
 100 105 110

Xaa Xaa Tyr Glu Tyr Tyr His Leu Glu Thr Gln Asp His Ala Val Ile
 115 120 125

Ile Ala Asp Gly Val Arg Thr Glu Ser Tyr
 130 135

<210> 82
 <211> 138
 <212> PRT
 <213> Methylobacterium extorquens

<220>
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 <223> Xaa can be any naturally occurring amino acid

<400> 82

Cys Phe Thr Thr Gly Thr Leu Ile Arg Thr Ala Arg Gly Ser Val Ala
 1 5 10 15

Val Glu Asp Leu Ile Val Gly Asp Leu Ala Val Thr Ala Ser Xaa Xaa
 20 25 30

Xaa Arg Pro Ile Thr Trp Ile Gly Asn Arg Ala Leu Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Ile Arg Ile Arg Ala Gly Ala
 50 55 60

Phe Gly Xaa Xaa Xaa Xaa Ala Arg Asp Leu Arg Leu Ser His Gly His
65 70 75 80

Pro Val Leu Val Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Val Leu Val
85 90 95

Pro Val Met Cys Leu Ile Asn Gly Thr Ser Val Xaa Xaa Xaa Xaa
100 105 110

Xaa Xaa Val Thr Tyr Trp His Ile Glu Leu Asp Ala His Asp Ile Leu
115 120 125

Leu Ala Glu Gly Leu Ala Ala Glu Ser Tyr
130 135

<210> 83
<211> 142
<212> PRT
<213> Silicibacter pomeroyi

<220>
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<222> (85)..(96)
<223> Xaa can be any naturally occurring amino acid

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<400> 83

Cys Phe Thr Pro Gly Thr Lys Ile Ala Thr Pro Lys Gly Glu Arg Leu
1 5 10 15

Val Glu Asp Leu Glu Val Gly Asp Arg Val Ile Thr Arg Asp Xaa Xaa
20 25 30

Xaa Gln Glu Ile Arg Trp Val Gly Ser Arg Thr Leu Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Val Leu Ile Arg Gln Gly Ala
50 55 60

Leu Gly Xaa Xaa Xaa Xaa Glu Arg Asp Met Ile Val Ser Pro Asn His
65 70 75 80

Arg Ile Leu Val Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
85 90 95

Glu Val Leu Val Ala Ala Lys His Leu Ile Gly Leu Glu Gly Val Xaa
100 105 110

Xaa Xaa Xaa Xaa Xaa Xaa Val Thr Tyr Ile His Phe Met Phe Asp Gln
115 120 125

His Glu Val Val Leu Ser Asp Gly Ala Trp Thr Glu Ser Phe
130 135 140

<210> 84
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<400> 84

Cys Phe Cys Arg Gly Thr Leu Ile Ala Thr Ala Gly Gly Glu Ile Pro
1 5 10 15

Val Glu Lys Leu Arg Pro Gly Asp Arg Val Ile Thr Arg Asp Xaa Xaa
20 25 30

Xaa Gln Arg Ile Arg Trp Ile Gly Gly Thr Ser Arg Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Pro Ile Arg Ile Arg Thr Gly Val Leu Lys Xaa Thr Arg
50 55 60

Asp Leu Leu Val Ser Pro Asn His Arg Ile Leu Met Xaa Xaa Xaa Xaa
65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Glu Val Leu Val Ala Ala Lys Phe
85 90 95

Leu Val Asp Gly Arg Ala Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Val Asp
 100 105 110

Tyr Tyr His Met Leu Phe Asp Gln His Glu Leu Val Leu Ser Glu Gln
 115 120 125

Ala Trp Ser Glu Ser Phe
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<400> 85

Cys Phe Ala Ala Gly Thr Arg Ile Glu Thr Asp Arg Gly Gly Arg Ala
 1 5 10 15

Ile Glu Asp Ile Ala Val Gly Asp Leu Val Leu Thr Arg Asp Xaa Xaa
 20 25 30

Xaa Gln Pro Val Arg Trp Thr Gly Arg Arg Ser Val Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Pro Ile Arg Ile Ala Ser Gly Lys Leu Gly Xaa Leu Arg
 50 55 60

Asp Leu Leu Val Ser Pro Gln His Arg Leu Leu Leu Xaa Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Glu Val Leu Ala Ala Ala Val His
 85 90 95

Leu Arg Asp Asp Arg His Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Val Thr
 100 105 110

Tyr Val His Leu Met Phe Asp Arg His Glu Ile Ile Tyr Ala Glu Gly
 115 120 125

Val Ala Ser Glu Ser Phe
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 <223> Xaa can be any naturally occurring amino acid

<400> 86

Cys Phe Thr Pro Gly Thr Arg Ile Ala Thr Pro Thr Gly Pro Arg Leu
 1 5 10 15

Ile Glu Glu Leu Arg Glu Gly Asp Lys Val Gln Thr Arg Asp Xaa Xaa
 20 25 30

Xaa Gln Glu Ile Gln Trp Ile Gly Gln Arg Arg Met Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Ile Arg Met Arg Val Gly Ala
 50 55 60

Leu Gly Xaa Xaa Xaa Xaa Asp Ala Glu Leu Leu Val Ser Pro Glu His
 65 70 75 80

Arg Met Leu Leu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 85 90 95

Glu Val Leu Val Pro Ala Arg Asp Leu Val Asn Asp Ser Thr Ile Xaa
 100 105 110

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Val Thr Tyr Val His Leu Leu Leu Pro
 115 120 125

Ser His Gln Ile Leu Trp Ala Asn Gly Ile Glu Thr Glu Ser Phe
 130 135 140

<210> 87
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<400> 87

Cys Phe Ala Ala Gly Thr Phe Ile Glu Ile Glu Ser Gly Pro Ile Pro
 1 5 10 15

Val Glu Thr Leu Arg Pro Gly Asp Leu Val Gln Thr Leu Asp Xaa Xaa
 20 25 30

Xaa Gln Pro Leu Leu Gln Leu Ala Lys Thr Thr Val Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Pro Val Leu Phe Arg Ala Gly Val Leu Gly Xaa Phe Arg
 50 55 60

Asp Leu Tyr Val Ser Gln Gln His Arg Met Leu Ile Xaa Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Glu Val Phe Val Pro Ala Arg Met
 85 90 95

Leu Val Asn Gly Ser Thr Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu Thr
 100 105 110

Tyr Tyr His Leu Leu Phe Ala Arg His Glu Ile Val Phe Ser Glu Gly
 115 120 125

Ile Pro Thr Glu Ser Tyr
 130

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<400> 88

Cys Phe Val Ala Gly Thr Leu Ile Asp Thr Pro Tyr Gly Glu Arg Gln
 1 5 10 15

Val Glu Arg Leu Thr Pro Gly Asp Gln Val Phe Thr Arg Asp Xaa Xaa
 20 25 30

Xaa Gln Glu Val Arg Trp Val Gly Glu Arg Thr Val Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Pro Ile Leu Ile Arg Ala Gly Thr Tyr Gly Xaa Gln Arg
 50 55 60

Asp Leu Met Val Ser Pro Gln His Arg Ile Leu Ile Xaa Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Glu Val Leu Val Ala Ala Lys Asp
 85 90 95

Leu Val Asp Gly Arg Arg Val Xaa Xaa Xaa Xaa Xaa Xaa Ile Thr
 100 105 110

Tyr Val His Val Met Phe Asp Ser His Gln Val Ile Tyr Ser Glu Gly
 115 120 125

Leu Ala Ser Glu Ser Phe
 130

<210> 89
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<400> 89

Ser Leu His Pro Glu Thr Pro Ile Ala Thr Pro Asp Gly Tyr Arg Pro
 1 5 10 15

Leu Ser Lys Ile Arg Arg Gly Asp Thr Val Ile Val Ala Ser Xaa Xaa
 20 25 30

Xaa Val Pro Val Leu His Arg Val Ser Arg Thr Met Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Pro Leu Thr Ile Arg Arg Pro Tyr Phe Gly Xaa Arg Gln
 50 55 60

Asp Ile Gln Ala Ala Pro Ser Gln Arg Leu Leu Leu Xaa Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Ser Val Leu Val Pro Ala Arg His
 85 90 95

Leu Thr Gly Gly His Ser Val Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Ala
 100 105 110

Thr Tyr Ala Gln Leu Leu Leu Pro Thr Asn Glu Ala Met Ile Thr Ala
 115 120 125

Gly Ala Leu Ala Glu Ser Leu
 130 135

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<400> 90

Cys Phe Val Ala Gly Ser Leu Ile Asp Thr Val Glu Gly Pro Arg Pro
 1 5 10 15

Val Glu Thr Leu Ala Val Gly Asp Leu Val Pro Val Glu Asp Xaa Xaa
 20 25 30

Xaa Gln Pro Ile Leu Trp Ile Gly Lys Arg Thr Leu Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Val Arg Ile Arg Arg Asp Ala
 50 55 60

Leu Gly Xaa Xaa Xaa Xaa His Arg Thr Leu Trp Val Ser Pro Gln His
 65 70 75 80

Arg Ile Val Leu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 85 90 95

Gln Val Phe Ala Ala Ala Ile His Leu Thr Asn Asp Asp Thr Ile Xaa
 100 105 110

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Val Thr Tyr Tyr His Leu Ala Phe Glu
 115 120 125

Arg His Leu Leu Leu Arg Ala His Gly Leu Leu Ser Glu Ser Ile
 130 135 140

<210> 91
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<400> 91

Cys Phe Thr Pro Gly Thr Leu Ile Ala Thr Ala His Gly Pro Arg Ala
 1 5 10 15

Ile Glu Thr Leu Arg Pro Gly Asp Leu Ile Val Thr Arg Asp Xaa Xaa
 20 25 30

Xaa Gln Pro Leu Arg Trp Val Gly Ser Arg Thr Val Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Pro Ile Arg Leu Asp Pro Thr Leu Leu Gln Xaa Xaa Ser
 50 55 60

Ala Pro Leu Leu Val Ser Pro Gln His Arg Met Leu Trp Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Glu Val Leu Val Ala Ala Thr
 85 90 95

His Leu Leu Gly Ser Pro Ala Ala Xaa Xaa Xaa Xaa Xaa Xaa Xaa Val
 100 105 110

Thr Tyr Met His Leu Met Leu Asp Arg His Glu Val Ile Tyr Ala Asn
 115 120 125

Asp Ala Ala Thr Glu Ser Phe
 130 135

<210> 92
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<400> 92

Cys Phe Thr Pro Gly Thr Ile Ile Asp Thr Glu Asp Gly Pro Arg Leu
 1 5 10 15

Ile Glu Glu Leu Gln Pro Gly Asp Leu Ile Arg Thr Leu Asp Xaa Xaa
 20 25 30

Xaa Gln Pro Leu Arg Trp Ile Gly Arg Thr Thr Val Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Pro Val Leu Ile Arg Ala Gly Ala Leu Asp Xaa Arg Arg
 50 55 60

Asp Leu Ile Val Ser Pro Gln His Arg Met Leu Ile Xaa Xaa Xaa Xaa
 65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gln Ala Leu Val Ala Ala Lys His
 85 90 95

Leu Val Asn Ala Arg Asp Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Val Thr
 100 105 110

Tyr Ile His Leu Leu Phe Asp Arg His Glu Ile Ile Trp Ala Glu Gly
 115 120 125

Cys Pro Thr Glu Ser Phe
 130

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<400> 93

Cys Phe Ala Ala Gly Thr Arg Ile Ala Thr Pro Lys Gly Ala Arg Pro
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Val Glu Thr Leu Ala Val Gly Asp Leu Val Gln Thr Leu Asp Xaa Xaa
 20 25 30

Xaa Gln Pro Ile Arg Trp Ile Gly Thr Arg Arg Val Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Val Val Ile Pro Ala His Ser
 50 55 60

Phe Ala Xaa Xaa Xaa Xaa Thr His Pro Leu Leu Leu Ser Gln Gln His
 65 70 75 80

Arg Val Leu Leu Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 85 90 95

Glu Ile Leu Ile Ala Ala Arg Arg Leu Thr Gly Leu His Gly Ile Xaa
 100 105 110

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Val Arg Tyr Ile His Phe Ala Leu Asp
 115 120 125

Arg His Glu Ile Val Phe Ala Asn Gly Leu Pro Ala Glu Thr Leu
 130 135 140

<210> 94
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<400> 94

Ser	Phe	Thr	Arg	Gly	Thr	His	Ile	Thr	Leu	Gly	Ser	Gly	Xaa	Gln	Val
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Arg	Ile	Glu	Asp	Leu	Lys	Val	Gly	Asp	Arg	Val	Leu	Thr	Arg	Asp	Xaa
		20						25					30		

Xaa	Xaa	Arg	Glu	Val	Arg	Trp	Ile	Gly	Gln	Thr	Thr	Val	Xaa	Xaa	Xaa
		35					40					45			

Xaa	Xaa	Xaa	Xaa	Pro	Ile	Val	Ile	Arg	Ala	Gly	Thr	Leu	Asn	Xaa	Glu
		50				55					60				

Asn	Asp	Leu	Val	Val	Ser	Pro	Asp	His	Arg	Leu	Phe	Val	Xaa	Xaa	Xaa
65					70					75				80	

Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Glu	Leu	Leu	Leu	Lys	Ala	Arg
				85					90					95	

His	Leu	Val	Asn	Gly	Asp	Thr	Val	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Xaa	Val
		100						105						110	

Asp	Tyr	Phe	Gln	Leu	Leu	Phe	Asp	Arg	His	His	Ile	Ile	Tyr	Ala	Glu
	115						120					125			

Gly	Ile	Ala	Ala	Glu	Thr	Met
	130					135

<210> 95

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<400> 95

Ala Phe Ser Arg Gly Ser Leu Ile Asp Thr Asp Cys Gly Pro Met Ala
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Ile Glu Asp Leu Leu Pro Gly Asp Arg Val Ile Thr Gln Asp Xaa Xaa
 20 25 30

Xaa Gln Glu Val Val Trp Lys Gly Ser Thr Val Ile Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu Thr Arg Ile Met Ala Asp
 50 55 60

Ala Phe Gly Xaa Xaa Xaa Xaa Met Ser Gly Val Ile Ala Gly Pro Ser
 65 70 75 80

Ala Arg Leu Leu Ala Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 85 90 95

Xaa Pro Met Leu Thr Pro Val Gln His Phe Val Asp Gly Met Gly Ile
 100 105 110

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Ile Glu Val Phe His Ile Cys Leu
 115 120 125

Arg Arg His Ala Val Ile Asn Val Asp Gly Leu Gln Phe Glu Thr Tyr
 130 135 140

<210> 96
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<400> 96

Gly Leu Pro Ala Gly Thr Met Leu Glu Thr Glu Ala Gly Trp Ser Pro
1 5 10 15

Val Glu Glu Ile Arg Pro Gly Thr Arg Val Ala Thr Ile Asp Xaa Xaa
20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
35 40 45

Xaa Leu Trp Arg Ile Pro Gly Gly Thr Leu Gly Xaa Cys Ser Asp Leu
50 55 60

Leu Leu Pro Glu Gly His Phe Leu Ala Leu Xaa Xaa Xaa Xaa Xaa Xaa
65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Thr Val Leu Ala Pro Val Ala Ala Leu Ala
85 90 95

Gly Phe Glu Gly Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Leu Pro Ala His
100 105 110

Ser Leu Arg Phe Ala Glu Glu Glu Val Val Trp Ala Gln
115 120 125

<210> 97
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<400> 97

Gly Phe Leu Ala Gly Thr Ile Leu Leu Thr Gln Asp Gly Glu Met Pro
1 5 10 15

Val Glu Phe Leu Ser Pro Gly Asp Arg Ile Ile Thr Arg Asp Xaa Xaa
20 25 30

Xaa Val Pro Leu His His Ile Thr Arg Ala Pro Gln Xaa Xaa Xaa Ala
35 40 45

Ile Arg Ile Ala Ala Gly Ser Leu Gly Xaa Xaa Xaa Xaa Asp Cys Asp
50 55 60

Leu Ile Leu Pro Ala Gly Gln Pro Val Leu Ile Xaa Xaa Xaa Xaa Xaa
65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gln Ala Met Val Arg Ala Asp Ala Leu
85 90 95

Val Asp Gly Glu Phe Ile Xaa Xaa Xaa Xaa Xaa Xaa Met Gln Leu
100 105 110

Phe Gln Leu His Phe Asp Ser Ala His Val Leu Tyr Ala Gly
115 120 125

<210> 98
<211> 132
<212> PRT
<213> Silicibacter pomeroyi

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<223> Xaa can be any naturally occurring amino acid

<400> 98

Gly Leu Leu Ala Gly Thr Ser Val Ala Ser Asn Phe Gly Trp Gln Pro
1 5 10 15

Val Glu Ala Leu Lys Val Gly Asp Lys Val Leu Thr Phe Asp Xaa Xaa
20 25 30

Xaa Gln Thr Val Ala Asp Ile Gln Arg Glu Thr Val Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Val Arg Leu Pro Glu Gly Val Cys
50 55 60

His Xaa Arg Arg Asp Leu Trp Met Met Pro Asp Gln Gly Leu Leu Val
65 70 75 80

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Tyr Ala Val Val
85 90 95

Pro Ala Arg Met Leu Arg Gly Tyr Arg Gly Ile Xaa Xaa Xaa Xaa Xaa
100 105 110

Xaa Xaa Xaa Val Glu Val Thr Thr Leu Ala Phe His Gln Asp Glu Val
115 120 125

Ile Tyr Val Glu
130

<210> 99
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<212> PRT
<213> Rhizobium leguminosarum

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<400> 99

Cys Phe Leu Arg Gly Thr Ala Ile Leu Thr Asp Cys Gly Glu Lys Pro
1 5 10 15

Val Glu Asn Leu Ser Ile Gly Asp Arg Val Ala Leu Pro Asp Xaa Xaa
20 25 30

Xaa Arg Pro Ile Lys Trp Val Gly Arg Gln Ser Phe Xaa Xaa Xaa Xaa
35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Ile Arg Val Ser Arg His Ala
50 55 60

Leu Asp Xaa Xaa Xaa Xaa His Ser Asp Leu Tyr Leu Ser Pro Gly His
65 70 75 80

Ala Leu Tyr Leu Xaa Gly Ile Leu Ile Gln Val Lys Asp Leu Val Asn
85 90 95

Gly Lys Thr Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Ile Glu
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Ala Glu Thr Glu Ser Phe
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35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Val Arg Val Arg Ala Gly Ala
50 55 60

Phe Gly Xaa Xaa Xaa Xaa Val Asn Asp Leu Phe Leu Ser Pro Gly His
65 70 75 80

Pro Val Leu Val Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Val Leu Val
85 90 95

Pro Val Met Cys Leu Ile Asn Gly Thr Thr Ile Xaa Xaa Xaa Xaa Xaa
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 20 25 30

Xaa Arg Thr Ile Thr Trp Ile Gly His Arg Glu Ile Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Val Arg Val Arg Ala Gly Ala
 50 55 60

Phe Gly Xaa Xaa Xaa Xaa Ala Arg Asp Leu Phe Leu Ser Pro Gly His
 65 70 75 80

Pro Val Leu Ile Xaa Xaa Xaa Xaa Xaa Xaa Xaa Gly Val Leu Val
 85 90 95

Pro Val Met Cys Leu Ile Asn Gly Thr Ser Ile Xaa Xaa Xaa Xaa Xaa
 100 105 110

Xaa Xaa Val Thr Tyr Trp His Val Glu Leu Asp Arg His Asp Ile Leu
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Leu Ala Glu Gly Leu Pro Ala Glu Ser Tyr
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Xaa Arg Pro Ile Val Trp Ile Gly His Arg Glu Ile Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Pro Val Arg Val Arg Thr Gly Ala
 50 55 60

Phe Gly Xaa Xaa Xaa Xaa Ala Arg Asp Leu Tyr Leu Ser Pro Gly His
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Pro Ile

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Glu Gly Leu Pro Ala Glu Ser Tyr
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Arg Leu Pro Ala Glu Ser Tyr
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 20 25 30

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 20 25 30

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 35 40 45

Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
 50 55 60

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Xaa Xaa Xaa Xaa Xaa Xaa Xaa Xaa
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Ile Asp Thr Leu Lys Val Gly Asp Ile Val Trp Ser Lys Pro Glu Gly
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Gly Gly Lys Pro Phe Ala Ala Ala Ile Leu Ala Thr His Ile Arg Thr
 35 40 45

Asp Gln Pro Ile Tyr Arg Leu Lys Leu Lys Gly Lys Gln Glu Asn Gly
50 55 60

Gln Ala Glu Asp Glu Ser Leu Leu Val Thr Pro Gly His Pro Phe Tyr
65 70 75 80

Val Pro Ala Gln His Gly Phe Val Pro Val Ile Asp Leu Lys Pro Gly
85 90 95

Asp Arg Leu Gln Ser Leu Ala Asp Gly Ala Ser Glu Asn Thr Ser Ser
100 105 110

Glu Val Glu Ser Leu Glu Leu Tyr Leu Pro Val Gly Lys Thr Tyr Asn
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Leu Thr Val Asp Val Gly His Thr Phe Tyr Val Gly Lys Leu Lys Thr
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Trp Val His Asn Thr
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20 25 30

Gly Ile Lys Val Thr Val Glu His Pro Asp Lys Leu Glu Glu Lys Phe
35 40 45

Pro Gln Val Ala Ala Thr Gly Asp Gly Pro Asp Ile Ile Phe Trp Ala
50 55 60

His Asp Arg Phe Gly Gly Tyr Ala Gln Ser Gly Leu Leu Ala Glu Ile
65 70 75 80

Thr Pro Asp Lys Ala Phe Gln Asp Lys Leu Tyr Pro Phe Thr Trp Asp
85 90 95

Ala Val Arg Tyr Asn Gly Lys Leu Ile Ala Tyr Pro Ile Ala Val Glu
100 105 110

Ala Leu Ser Leu Ile Tyr Asn Lys Asp Leu Leu Pro Asn Pro Pro Lys
115 120 125

Thr Trp Glu Glu Ile Pro Ala Leu Asp Lys Glu Leu Lys Ala Lys Gly
130 135 140

Lys Ser Ala Leu Met Phe Asn Leu Gln Glu Pro Tyr Phe Thr Trp Pro
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 Leu Ile Ala Ala Asp Gly Gly Tyr Ala Phe Lys Tyr Glu Asn Gly Lys
 165 170 175
 Tyr Asp Ile Lys Asp Val Gly Val Asp Asn Ala Gly Ala Lys Phe Leu
 180 185 190
 Val Asp Leu Ile Ala Gly Leu Thr Lys Asn Lys His Met Asn Ala Asp
 195 200 205
 Thr Asp Tyr Ser Ile Ala Glu Ala Ala Phe Asn Lys Gly Glu Thr Ala
 210 215 220
 Met Thr Ile Asn Gly Pro Trp Ala Trp Ser Asn Ile Asp Thr Ser Lys
 225 230 235 240
 Val Asn Tyr Gly Val Thr Val Leu Pro Thr Phe Lys Gly Gln Pro Ser
 245 250 255
 Lys Pro Phe Val Gly Val Leu Ser Ala Gly Ile Asn Ala Ala Ser Pro
 260 265 270
 Asn Lys Glu Leu Ala Lys Glu Phe Leu Glu Asn Tyr Leu Leu Thr Asp
 275 280 285
 Glu Gly Leu Glu Ala Val Asn Lys Asp Lys Pro Leu Gly Ala Val Ala
 290 295 300
 Leu Lys Ser Tyr Glu Glu Glu Leu Ala Lys Asp Pro Arg Ile Ala Ala
 305 310 315 320
 Thr Met Glu Asn Ala Gln Lys Gly Glu Ile Met Pro Asn Ile Pro Gln
 325 330 335
 Met Ser Ala Phe Trp Tyr Ala Val Arg Thr Ala Val Ile Asn Ala Ala
 340 345 350
 Ser Gly Arg Gln Thr Val Asp Glu Ala Leu Lys Asp Ala Gln Thr Asn
 355 360 365
 Ser Ser Ser Asn Asn Asn Asn Asn Asn Asn Asn Asn Asn Leu Gly Ile
 370 375 380
 Glu Gly Arg Ile Ser Glu Phe Gly Ser Thr Ser Arg Val Asp Cys Gly
 385 390 395 400
 Gly Leu Thr Gly Leu Asn Ser Gly Leu Thr Thr Asn Pro Gly Val Ser
 405 410 415
 Ala Trp Gln Val Asn Thr Ala Tyr Thr Ala Gly Gln Leu Val Thr Tyr
 420 425 430

Asn Gly Lys Thr Tyr Lys Cys Leu Gln Pro His Thr Ser Leu Ala Gly
 435 440 445

Trp Glu Pro Ser Asn Val Pro Ala Leu Trp Gln Leu Gln
 450 455 460

<210> 109
 <211> 541
 <212> PRT
 <213> artificial sequence

<220>
 <223> MBP-PsyBIL carboxy terminal cleavage product

<400> 109

Met Lys Thr Glu Glu Gly Lys Leu Val Ile Trp Ile Asn Gly Asp Lys
 1 5 10 15

Gly Tyr Asn Gly Leu Ala Glu Val Gly Lys Lys Phe Glu Lys Asp Thr
 20 25 30

Gly Ile Lys Val Thr Val Glu His Pro Asp Lys Leu Glu Glu Lys Phe
 35 40 45

Pro Gln Val Ala Ala Thr Gly Asp Gly Pro Asp Ile Ile Phe Trp Ala
 50 55 60

His Asp Arg Phe Gly Gly Tyr Ala Gln Ser Gly Leu Leu Ala Glu Ile
 65 70 75 80

Thr Pro Asp Lys Ala Phe Gln Asp Lys Leu Tyr Pro Phe Thr Trp Asp
 85 90 95

Ala Val Arg Tyr Asn Gly Lys Leu Ile Ala Tyr Pro Ile Ala Val Glu
 100 105 110

Ala Leu Ser Leu Ile Tyr Asn Lys Asp Leu Leu Pro Asn Pro Pro Lys
 115 120 125

Thr Trp Glu Glu Ile Pro Ala Leu Asp Lys Glu Leu Lys Ala Lys Gly
 130 135 140

Lys Ser Ala Leu Met Phe Asn Leu Gln Glu Pro Tyr Phe Thr Trp Pro
 145 150 155 160

Leu Ile Ala Ala Asp Gly Gly Tyr Ala Phe Lys Tyr Glu Asn Gly Lys
 165 170 175

Tyr Asp Ile Lys Asp Val Gly Val Asp Asn Ala Gly Ala Lys Ala Gly
 180 185 190

Leu Thr Phe Leu Val Asp Leu Ile Lys Asn Lys His Met Asn Ala Asp
 195 200 205

Thr Asp Tyr Ser Ile Ala Glu Ala Ala Phe Asn Lys Gly Glu Thr Ala
 210 215 220

Met Thr Ile Asn Gly Pro Trp Ala Trp Ser Asn Ile Asp Thr Ser Lys
225 230 235 240

Val Asn Tyr Gly Val Thr Val Leu Pro Thr Phe Lys Gly Gln Pro Ser
245 250 255

Lys Pro Phe Val Gly Val Leu Ser Ala Gly Ile Asn Ala Ala Ser Pro
260 265 270

Asn Lys Glu Leu Ala Lys Glu Phe Leu Glu Asn Tyr Leu Leu Thr Asp
275 280 285

Glu Gly Leu Glu Ala Val Asn Lys Asp Lys Pro Leu Gly Ala Val Ala
290 295 300

Leu Lys Ser Tyr Glu Glu Glu Leu Ala Lys Asp Pro Arg Ile Ala Ala
305 310 315 320

Thr Met Glu Asn Ala Gln Lys Gly Glu Ile Met Pro Asn Ile Pro Gln
325 330 335

Met Ser Ala Phe Trp Tyr Ala Val Arg Thr Ala Val Ile Asn Ala Ala
340 345 350

Ser Gly Arg Gln Thr Val Asp Glu Ala Leu Lys Asp Ala Gln Thr Asn
355 360 365

Ser Ser Ser Asn Asn Asn Asn Asn Asn Asn Asn Asn Asn Leu Gly Ile
370 375 380

Glu Gly Arg Ile Ser Glu Phe Gly Ser Cys Phe Ala Ala Gly Thr Met
385 390 395 400

Val Ser Thr Pro Asp Gly Glu Arg Ala Ile Asp Thr Leu Lys Val Gly
405 410 415

Asp Ile Val Trp Ser Lys Pro Glu Gly Gly Gly Lys Pro Phe Ala Ala
420 425 430

Ala Ile Leu Ala Thr His Ile Arg Thr Asp Gln Pro Ile Tyr Arg Leu
435 440 445

Lys Leu Lys Gly Lys Gln Glu Asn Gly Gln Ala Glu Asp Glu Ser Leu
450 455 460

Leu Val Thr Pro Gly His Pro Phe Tyr Val Pro Ala Gln His Gly Phe
465 470 475 480

Val Pro Val Ile Asp Leu Lys Pro Gly Asp Arg Leu Gln Ser Leu Ala
485 490 495

Asp Gly Ala Ser Glu Asn Thr Ser Ser Glu Val Glu Ser Leu Glu Leu
500 505 510

100

Tyr Leu Pro Val Gly Lys Thr Tyr Asn Leu Thr Val Asp Val Gly His
515 520 525

Thr Phe Tyr Val Gly Lys Leu Lys Thr Trp Val His Asn
530 535 540